

Socio-ecological indicators to evaluate Global Change effects on Mediterranean river basins.

The study cases of Tordera and Besòs River Basins

Indicateurs socio-écologiques pour évaluer les effets du changement global sur les bassins fluviaux méditerranéens. Les cas d'étude des bassins de la Tordera et de Besòs

Introduction

Mediterranean areas have strong inter-annual climatic variability mainly characterized by a dry period in summers. This, in addition to a great water demand to meet the needs of the increasing population and other anthropogenic related activities such as the development of industry, intensive agriculture and tourism activities [1] represents an evident variability in annual rivers discharge regime, from permanent to temporal.

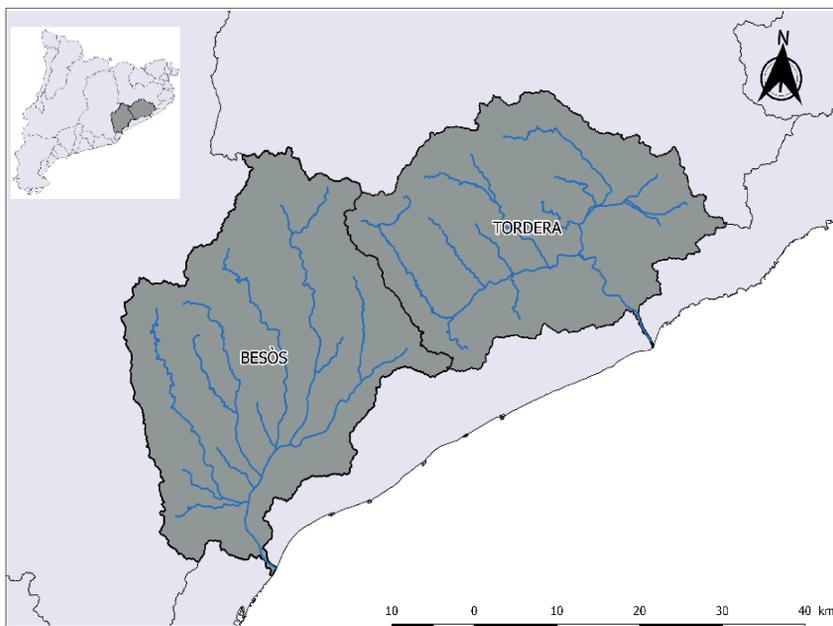
The main goal of this study is to explore Global Change effects through Land Use and Land Cover (LULC) change analysis and to relate these changes with the water quality indicators in two Mediterranean river basins: Tordera and Besòs (NE Catalonia). As a result, the research suggests to build a transversal socio-ecological indicator that can be upscaled to other Mediterranean river basins.

Study Areas

The Tordera and Besòs river basins have a typical Mediterranean hydrological regime and are located in the North East of Catalonia with a total surface of 898 km² and 1,038 km², respectively.

The presence of Natural Protected Areas in the upper course and the pressures derived from human activities of different typology in medium and lower courses, especially those derived from strategic mobility infrastructures —High-Speed Train (AVE, in its Spanish initials) or AP7 (the motorway which connects Spain and France)— and tourism, make the Tordera river basin an ideal socio-ecological monitoring area [2].

During the 1960s and 1970s decades, the Besòs river basin underwent a great industrial development and also a demographical increase, which caused an abusive use of the rivers with several consequences (e.g. decrease in water levels due to the increase of water extraction for domestic and industrial uses).



Methods

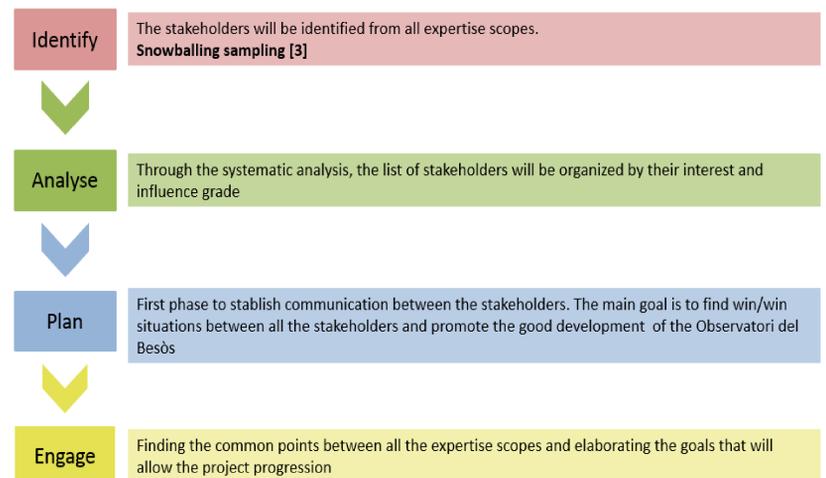
1. Long-term monitoring methods for river quality assessment

In 1996 L'Observatori de la Tordera project was created with the main goal to apply long-term monitoring methodologies and to define and to evaluate indicators that allow to measure the ecological status and the sustainability level of Tordera river basin.



2. Stakeholder mapping and data compilation

To compile all the information related to water quality indicators, the creation of a stakeholder map is required to engage local experts from different scopes (political, academic and social). This methodology will be developed in four main phases:



3. Water quality indicators and LULC correlation analysis

The research focuses on the streamflow variations in different river through statistical linear models between regional climatic variables and streamflow based on a regression analysis. Streamflow variations can be as well correlated with other factors as those produced by anthropogenic activities. Taking into account that Land Use and Land Cover (LULC) change is considered as the main component of Global Change effects in the region, a second methodological phase is required to explore the relationships between non-climatic flow variations and LULC to determine Global Change effects [4].

Expected results and conclusions

This research is a methodological approach to evaluate Global Change effects on water quality indicators. Through the previous experience in Tordera river basin L'Observatori del Besòs project has recently been launched with the aim to become an effective and transversal tool to define socio-ecological indicators to evaluate Global Change effects in Mediterranean river basins.

The new challenges coming from contrasting flow level and climatic conditions correlations will serve to build a more robust methodology and adaptable to the variety of circumstances that may be found in different study cases.

References

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